

REMARKS

Reconsideration and allowance of the instant application are respectfully requested. Claims 1-9 remain pending. By this communication, claims 1, 5, and 6 are amended.

In an interview conducted on February 26, 2008, the Examiner indicated that Applicants' amendment overcomes the rejection under 35 U.S.C. §112, first paragraph and distinguishes the claimed embodiment over the prior art of record.

In numbered paragraph 5 beginning on page 3 of the Office Action, claims 1-9 are rejected under 35 U.S.C. §112, first paragraph, for allegedly lacking enablement. Applicants respectfully traverse this rejection. However, in an effort to expedite prosecution, claims 1 and 5 are amended to address the Examiner's concerns. Because the Examiner acknowledged that the amendment overcomes this rejection, withdrawal of the rejection is respectfully requested.

Claim 6 was rejected under 35 U.S.C. §112, second paragraph, as indefinite. Applicants respectfully traverse this rejection. However in an effort to expedite prosecution, claim 6 has been amended for clarity. Therefore, withdrawal of this rejection is respectfully requested.

Claims 1-3, 8, and 9 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over *Lang et al.* (U.S. Patent No. 6,426,561) in view of *Tsuruoka* (U.S. Patent NO. 4,403,242) and *Kogo et al.* (U.S. Patent No. 5,437,921). Applicants respectfully traverse this rejection.

As shown in Figures 1 and 2, Applicants describe an exemplary press pack module in which a semiconductor chip 2 is sandwiched between a conductive base

plate 4 and a conductive top plate 3. A contact piston 5 is mounted on the top plate 3, and presses the top plate 3, the semiconductor chip 2, and the base plate 4. A first module power connection 11 is mounted on the contact piston 5 and the base plate 4 is mounted on a second module power connection 12. The pressure applied between the first and second module power connections 11 and 12 flattens any bow in the composite top and base plates 3 and 4 that occurs based on manufacturing or processing conditions.

Applicants' claim 1 broadly encompasses the aforementioned features by reciting a press pack module that comprises, among other features, a contact piston in pressing contact with the top plate, a first module power connection in pressing contact with the contact piston, and a second module power connection in pressing contact with the base plate, wherein a material is provided adjacent at least one of said first or second main electrodes that, together with the semiconductor material forms a eutectic alloy or an alloy whose melting point is below that of the semiconductor material, and wherein at least one of said base plate or top plate is made of metal matrix composite material comprising two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix, whose coefficient of thermal expansion is close to that of the semiconductor material, said metal matrix composite material containing said alloy-forming material.

The *Lang*, *Tsuruoka*, and *Kogo* patents fail to establish a *prima facie* case of obviousness because when applied individually or collectively as alleged these references do not teach every element recited in Applicants' claims.

For example, the *Lang* patent discloses an insulated gate bipolar transistor (IGBT) module having a semiconductor 4 that includes main electrodes 5, 6 formed

on a top face and bottom face of the semiconductor, respectively. A layer 7 is mounted between one of the main electrodes 5, 6, and an adjacent metallic contact surface.

The Examiner appears to allege that the layer 7 is analogous to Applicants' claimed base and top plates. Applicants disagree because the *Lang* patent fails to disclose that the layer 7 is made of a metal matrix composite (MMC) material. Rather, the layer 7 is described as being composed of a paste or metal foil. Neither of which have the mechanical or structural characteristics of an MMC.

The *Tsuruoka* patent is applied in an effort to cure the deficiencies of the *Lang* patent as it relates to the base plate and top plate being formed of the same metal matrix material as recited in Applicants' claim 1. The *Tsuruoka* patent discloses a semiconductor device 100 that includes a metal-fiber composite material as an electrode. The semiconductor 100 includes a cathode electrode that is formed on a substrate 102. The cathode electrode 105 includes an upper piece 112 and a lower piece 111. The lower piece 111 is made of a metal-fiber composite material, which includes fibers (carbon, Mo, W) that are buried in a metal (Cu). The fibers being oriented concentrically (col. 4, lines 55-57).

The *Tsuruoka* patent fails to disclose or suggest that the metal fibers are randomly distributed short cut graphite as recited in Applicants' claims. Rather, the *Tsuruoka* patent discloses that carbon fibers are concentrically oriented around a center opening of the lower piece 111 (col. 4, line 34-35). One of ordinary skill would recognize that short-cut fibers cannot be used to achieve a concentric orientation as taught by the *Tsuruoka* patent, since the length of the fibers would frustrate the

process of concentric achieving the desired orientation. Thus, the *Tsuruoka* patent cannot remedy the deficiencies of the *Lang* patent with respect to this feature.

The *Kogo* patent was applied to remedy the acknowledged deficiencies of the *Lang* and *Tsuruoka* patents with respect to Applicants' claimed top or base plate being formed of a metal matrix composite material comprising two-dimensional randomly distributed short cut graphite fibers.

The *Kogo* patent discloses a base material for mounting electronic components, where the base material comprising aluminum or an aluminum alloy that is reinforced with carbon fibers, which are being arranged at random on a surface for mounting an electronic component. See Abstract.

While being generally related to the fabrication of a carrier and substrate in an electronic device, the teachings of the *Kogo* patent are not particularly related to the fabrication of a layer structure such as the press-pack module recited in Applicants' claims. Particularly, the *Kogo* patent fails to provide insight into how the disclosed base material can be comprised of eutectic alloy materials and be provided in a device structure to be in direct contact with a semiconductor chip as a top plate and bottom plate as recited in Applicants' claims. Rather, at best, the *Kogo* patent discloses the composite structure being in contact with a semiconductor device having a ceramic package (col. 5, lines 10-13).

In summary, the *Lang*, *Tsuruoka*, and *Kogo* patents when applied individually or collectively as suggested by the Examiner, fail to establish a *prima facie* case of obviousness. Particularly, the combined documents fail to establish a nexus between their respective teachings such that one of ordinary skill could reasonably conclude that a semiconductor having a first main electrode that makes contact with

a base plate and a second main electrode that makes contact with a top plate, wherein at least one of said base plate or top plate is made of metal matrix composite material comprising of two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix, whose coefficient of thermal expansion is close to that of the semiconductor material, said metal matrix composite material containing said alloy-forming material is achievable.

For example, the combined documents may arguably disclose a method of manufacturing a composite material for use in electronic devices but does not disclose a composite material that has structural relationship to a semiconductor material as recited in Applicants' claims. For these reasons, one of ordinary skill would have no reason to combine these teachings to achieve the Applicants' claimed results.

The Office is reminded that the Office has the initial burden of establishing a **factual basis** to support the legal conclusion of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). For rejections under 35 U.S.C. § 103(a) based upon a combination of prior art elements, in *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007), the Supreme Court stated that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." "Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some **articulated reasoning with some rational underpinning** to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (emphasis added). Therefore, withdrawal of this rejection is respectfully requested.

By the foregoing amendments and remarks. Applicants respectfully submit that this application is in condition for allowance, and request favorable consideration and examination of the same. In the event any issues remain, the Examiner is invited to contact Applicants' representative identified below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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By:



Shawn B. Cage
Registration No. 51522

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620